

math317 Syllabus

math 317: Probability, Statistics, and Number Systems For PK-8 Teachers

Text: *Math 317 - Probability, Statistics & Special Topics*, by Lee Price and Beth Borel, Fall 2014

Prerequisites: MATH 107, MATH 117 and MATH 217 with a grade of C or better. Restriction: Education majors only.

Course Description:

Descriptive statistics, probability, patterns, development of number systems and their properties, and problem solving through real world situations. Understanding and proper use of mathematical language.

This content in this course aligns with that of K-8 schools, giving prospective teachers the knowledge of mathematics that they will need to effectively teach the CCSS content. Also, an emphasis is placed on the Standards for Mathematical Practice as described in the CCSS, allowing prospective teachers to experience what their future K-8 students will experience. Prospective teachers enrolled in this course are expected to:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriately tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course Outcomes:

Students will learn:

How important concepts can be developed in a smooth progression, giving special attention to significant mathematics and cognitive transitions;

How the Big Ideas are rooted and interconnected in real-world contexts, and how they can be modeled using familiar objects and situations;

How number sense, spatial sense, intuition, and problem-solving permeate everything;

That reasoning and ordinary language are essential components of concept development.

Students will have intuition, skills and deep understanding of the number sense concepts in pre-K through 8th grade.

Instructional Methods:

Visual aids such as charts and drawings are presented to help the students grasp the mathematical concepts. A wide variety of techniques, approaches, and appropriate tools will be used as students are encouraged to solve problems in different ways. Emphasis is placed on the students' ability to express "in writing" how they solve various types of problems and how they know that the answer is correct. Manipulatives will be used to model mathematical topics and arithmetic operations.

Calculators: Students are not allowed to use calculators. Students are expected to use the methods developed to do calculations mentally and well as incorporating these methods to pencil and paper work. All explanations should be clear and concise and written at an elementary level.

Sections and Topics

- Introduction to Course
- Section 1: Chances Are?
 - . Simple probability
 - . Sample space
 - . Experiments
 - . Events
- Section 2: This or That?
 - . Compound Probability (and & or)
 - . Use of tables in probability
 - . Complementary event ($1-P(E)=P(E')$)
- Section 3: How Odd?
 - . Odds
 - . Ratios
- Section 4: And Then What Happened?
 - . Independent and Dependent Events
 - . Conditional Probability
 - . Probability Tree Diagrams
- Section 5: The Power of Venn
 - . Venn Diagrams
- Section 1: Order Please!
 - . Multiple Counting Principle
 - . Permutations
- Section 2: Group Work?
 - . Combinations
 - . Factorials
- Section 3: Mixed Nuts?
 - . Combination vs Permutation
 - . Use Complements to find answers to "at least" type problems
- Section 4: Target Practice
 - . Probability with geometric figures
- Section 1: Worth a Thousand Words: Part 1 – Qualitative Data
 - . Quantitative vs Qualitative

- . Pictograph
- . Circle Graph / Pie Chart
- . Bar graph
- Section 2: Worth a Thousand Words: Part 2 – Quantitative Data
- . Line plot / Dot plot
- . Graphs descriptors: outliers, clusters, gaps, ...
- . Graphs distributions: random, uniform, symmetric, skewed
- . Stem-Leaf Plot
- . Discrete vs Continuous data
- . Histogram
- Section 3: The Average American Teenager?
- . Mean, Median, Mode
- . Weighted Average
- Section 4: Spread the News
- . Mean Absolute Deviation
- . Five Number Summary
- . Box and Whiskers Plot
- . Standard Deviation
- Patterns: Arithmetic Sequences
- Patterns: Geometric Sequences